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ABSTRACT

Numerous factors can make an area attractive to high technology industries, including: (1) local exclusionary zoning and restrictive covenants which seek to enhance the beauty of industrial park areas; (2) mutually beneficial affiliations with universities; (3) installation of special utility lines to minimize disruption of service to park areas; and (4) indigenous factors such as restrictive land-use planning, quality of community life, proximity to local colleges and universities, and the use of special strategies to help the development of new, high-technology firms. In many of the areas that have attracted or developed high-technology industries, a close alliance with a higher education institution has been an important consideration. The colleges and universities provide research facilities for firms, as well as a pool of qualified, newly-trained personnel. Cooperation between colleges and firms helps bridge the gap between the first generation of an idea and the commercialization of a product or process. Finally, colleges can play an important role as catalysts in the transformation of economies from manufacturing to information-based industries. In order to ensure economic growth, state governments should develop policies to encourage relationships between businesses and colleges. (AJL)

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THE INTEGRATION OF ECONOMIC DEVELOPMENT AND EDUCATION: MAKING HIGH TECHNOLOGY WORK

A Presentation before the
1988 Quad State Legislative Conference
Hagerstown, Maryland

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Introduction

Local jurisdictions have established a new priority for economic growth in recent years, fostering high technology development--both by attracting firms to relocate and by stimulating indigenous firm formation and growth. Although the high technology sector is volatile, local economic development professionals correctly perceive the significance of its potential benefits. For example, the economic future of a whole locale can be altered by a single major decision as in the case of Citicorp choosing to locate its processing plant in Hagerstown or Kelly Springfield locating its corporate headquarters in Cumberland.

Does high technology relocation or development require different local initiatives than the process of traditional economic growth? This question was examined by Yin, Sottile, and Bernstein of the Cosmos Corporation located in Washington, DC. They examined successfully developed high technology parks in nine locations across the country. Their findings suggest that high technology development uses many of the same initiatives as traditional economic growth; however, the high technology parks went further and used three additional initiatives:

- Exclusionary zoning and restrictive covenants, to increase the architectural beauty of the buildings and the amount of open space in a park, and to minimize the presence of trucks, loading docks, railroad lines, and overly dense facilities typical of an industrial park;

- Development of university affiliations, involving either university ownership or operation of the park or other special relationships to develop mutually beneficial employment arrangements for high-technology personnel;

- Special utility lines, in which local power companies install reinforced electrical lines to minimize any disruption of service to the park, or telephone companies make expanded telephone connections possible.[1]

A local area that can implement all of these initiatives in relation to its economic development strategy will create an attractive setting for high technology.

Rationale

Along with the initiatives cited above, certain indigenous factors are important to establishing a rationale for high technology economic development. Four of them are:

- Restrictive land-use planning, to ensure that only "clean and attractive operations are located on the site";
- The quality of community life, including the availability of good housing, school systems, recreational activities, and cultural activities;
- Proximity to local colleges and universities, including formal associations with these institutions, such as university centers conducting contract research for industry; and
- The use of special, "incubator" [strategies] to help the development of new, high-technology firms.[2]

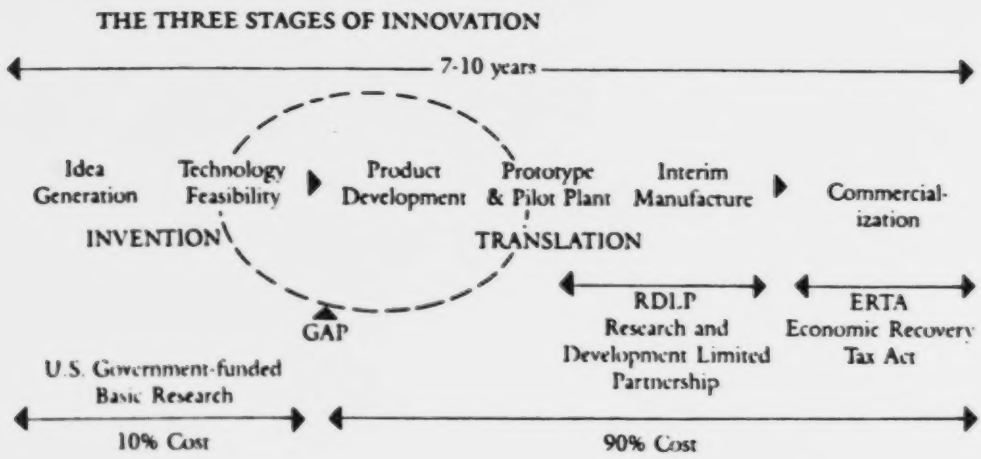
These factors create an infrastructure that attracts new industry as well as an environment in which existing industry can achieve its full potential.

A Role for Higher Education?

The Cosmos Corporation study discovered that in many of the environments which had successfully attracted or developed high technology industries there was a close alliance with a higher education institution. The rationale for this relationship is that higher education produces graduates who become a source of employees within the same locale, reducing the brain drain from that locale or even from the state. Also, the high technology industries that locate in the park have a built-in labor pool which can be trained to their specifications. The result is a more quickly productive employee and lower recruitment costs, particularly in high technology specialty areas. Finally, both industry and the educational facility benefit through the process of shared research facilities. In essence, the educational institution becomes an integral part of the high technology research and development process.

The Innovation Gap

Innovation which leads to the relocation or development of high technology industry has been described by Felker as a three-stage process. Stage 1 is the invention. Stage 2 is the process of translating the invention into a new product or process. Almost 90% of the cost, risk, and time associated with innovation is found in the second stage. Stage 3 is the successful commercialization of the product or process.[3]



"Cooperative Industrial R&D: Funding the Innovation Gap"
Lansing Felker

The most critical dimension of the process is found in late Stage 1 through middle Stage 2. From technology feasibility through production development to prototype and pilot production, it is necessary for extensive cooperation between industry and education if the potential of the innovation is to be realized. What can be done in a local area to insure that the innovation gap does not defeat a successful economic development strategy?

Bridging the Gap

Four strategies--marketing, technology, resource development, and human resource management--are proposed as components of a planning process designed to bridge Felker's innovation gap. Each of these strategies presents a specific question.

- Marketing Strategy: "What business are you in?" Prior to recruiting new industry or developing indigenous potential it is important to ascertain what the local environment is best suited to support or develop.
- Technology Strategy: "What tools and tactics will be used?" Are there existing technology levels that can be upgraded or does the potential exist for integrating a new technology with an existing technology?
- Resource Development Strategy: "How much innovation can the local area afford?" What sources of capital can be tapped to pay for high technology?
- Human Resource Management Strategy: "Who will develop the technology?" Who will work in it, and, most importantly, who will prepare both the research and manufacturing personnel necessary to make high technology a reality?

Washington County and the four-state area would seem to be an ideal location to test the validity of the foregoing assumptions. The U.S. Department of Commerce reports that most economic growth and development occurs in firms with less than 500 employees. This situation is very descriptive of Washington County. Now it is important to examine what tactics to use in realizing the potential of the county.

Conclusion: Toward a Technology Transfer Model

In 1982 the Joint Economic Committee of the U.S. Congress conducted a national survey to identify the factors that influence the regional location choices of high technology companies. The results are interesting:

Rank	Attribute	Percent Significant or Very Significant
1.	Labor Skills/Availability	89.3
2.	Labor Costs	72.2
3.	Tax Climate Within the Region	67.2
4.	Academic Institutions	58.7
5.	Cost of Living	58.5
6.	Transportation	58.4
7.	Access to Markets	58.1
8.	Regional Regulatory Practices	49.0
9.	Energy Costs/Availability	41.4
10.	Cultural Amenities	36.8
11.	Climate	35.8
12.	Access to Raw Materials	27.6

The factors ranked first and fourth produce an important interactive effect. The labor force from which skilled workers will be drawn (factor 1) can be prepared to meet the needs of specific businesses or industries if the academic institutions serving a specific area (factor 4) have the ability to identify and transfer the appropriate technology.[4]

Technology transfer has been defined by Mogavero and Shane as the identification of knowledge appropriate to solving a problem or meeting a need, the design of a medium for its provision by those who have it to those who need it, and the identification of a process for its use.[5] Once the technology is in operation, the transfer is complete. Without a mechanism for transfer, the mere presence of academic institutions guarantees nothing. A work force with the skills needed by high technology business or industry does not develop automatically.

The elements needed for economic development have been identified. What link exists between state policy toward higher education and economic growth? Jones and Vedlitz conducted a national study seeking an answer to this question. Their findings are useful in identifying what will be needed to make technology transfer a reality:

- Educational quality seems to be more important in facilitating economic growth than does level of spending.
- Level of state spending . . . is related to change in the establishment of new firms and is the more important predictor of that economic indicator.
- Can a state significantly improve its educational quality and therefore improve its economic development by increasing its state spending for higher education? It would appear that the answer is a qualified yes.

Their conclusion provides direction for state government. "Higher education seems to be a critical catalyst in the transformation of economies from manufacturing based to information based, and those states with the best educational systems are making the transformation most effectively."[6]

In conclusion, higher education is a vital link between the research environment and application by business and industry. It acts as a conduit between design and production; each aspect learns from the other and each makes an important contribution to the development, transfer, and application of technology. By strategically assigning resources, it is possible for state government to assure economic growth through technology adaptation and transfer implemented by higher education. Washington County with the presence of Hagerstown Junior College's Advanced Technology Center and the Frostburg State University Center can become a model for Maryland.

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